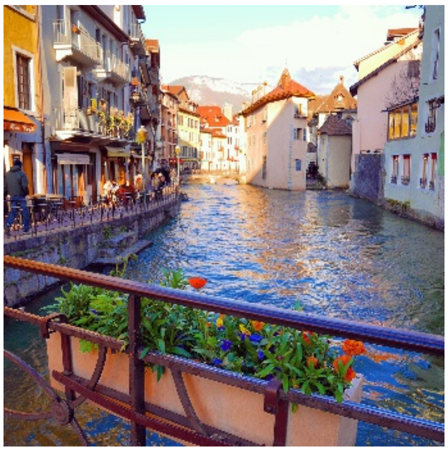
Landscape Art Adventures

```
(ns opencv3.cartoon3
  (:require
   [opencv3.core :refer :all]
   [opencv3.utils :as u]))
```

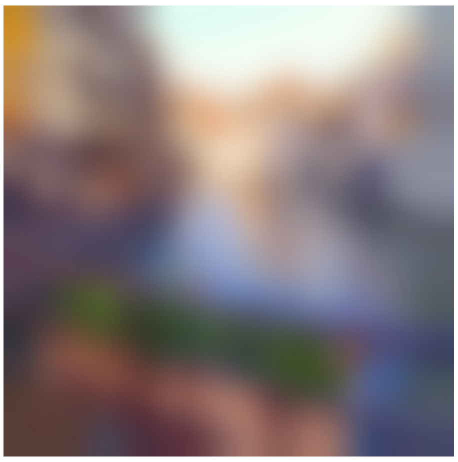
```
nil
```

```
(def img
  (-> "https://cdn.theculturetrip.com/wp-content/uploads/2016/01/canals2.jpg"
  u/mat-from-url
  (u/resize-by 0.2)))
(u/mat-view img)
```



smoothing the picture using a bilateral filter

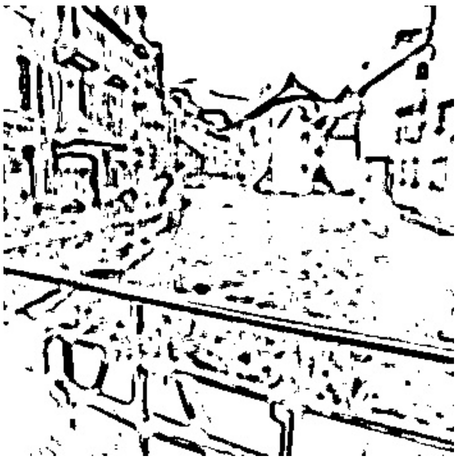
```
(def factor 4)
(def output (new-mat))
(def work (clone img))

(dotimes [_ factor] (pyr-down! work))
(bilateral-filter work output 9 9 7)
(dotimes [_ factor] (pyr-up! output))

(u/mat-view output)
```



detect and enhance edges

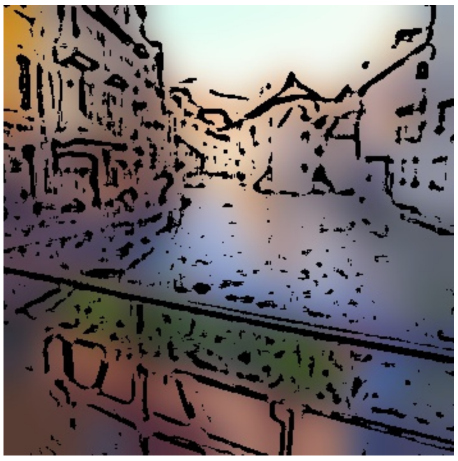
- Reduce noise using a median filter
- Create an edge mask using adaptive thresholding

```
(def edge
  (-> img
    clone
    (resize! (new-size (.cols output) (.rows output)))
    (cvt-color! COLOR_RGB2GRAY)
    (median-blur! 7)
    (adaptive-threshold! 255 ADAPTIVE_THRESH_MEAN_C THRESH_BINARY 9 7)
    (cvt-color! COLOR_GRAY2RGB)))
(u/mat-view edge)
```



Combine color image with edge mask

```
(let [result (new-mat) ]
  (bitwise-and output edge result)
  (u/mat-view result))
```

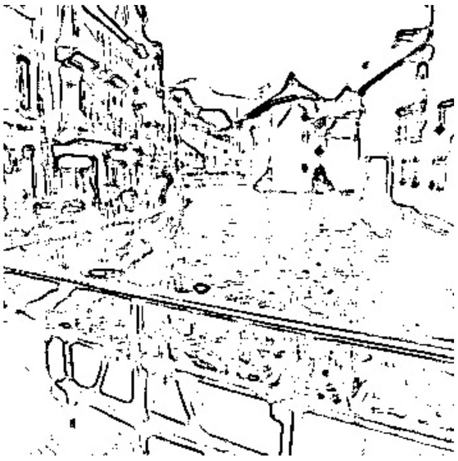


Playing with contours

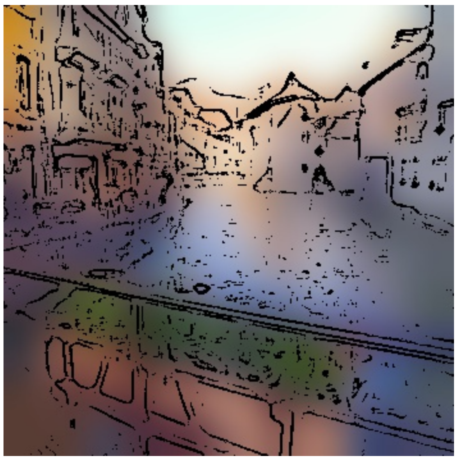
Of course you can play with the contours size and numbers. The adaptive-threshold! does that with its last two parameters.

The **edges-thickmess** parameter controls how thick the contours will be, and the **edges-number** controls how many of them should be drawn.

```
(def edges-thickness 5)
(def edges-number 5)
(def edge
  (-> img
    clone
    (resize! (new-size (.cols output) (.rows output)))
    (cvt-color! COLOR_RGB2GRAY)
    (median-blur! 7)
    (adaptive-threshold! 255 ADAPTIVE_THRESH_MEAN_C THRESH_BINARY edges-thickness edges-
number)
    (cvt-color! COLOR_GRAY2RGB)))

(u/mat-view edge)
```



```
(let [result (new-mat) ]
  (bitwise-and output edge result)
  (u/mat-view result))
```



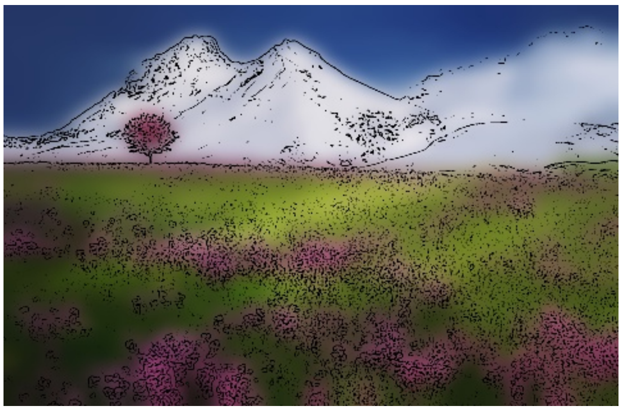
turning all this in functions

```
(defn smoothing!
  [img factor filter-size filter-value]
  (let [ work (clone img) output (new-mat)]
  (dotimes [_ factor] (pyr-down! work))
  (bilateral-filter work output filter-size filter-size filter-value)
  (dotimes [_ factor] (pyr-up! output))
  (resize! output (new-size (.cols img) (.rows img)))))

(defn edges!
  [img e1 e2 e3]
  (-> img
    clone
    (cvt-color! COLOR_RGB2GRAY)
    (median-blur! e1)
    (adaptive-threshold! 255 ADAPTIVE_THRESH_MEAN_C THRESH_BINARY e2 e3)
    (cvt-color! COLOR_GRAY2RGB)))

(defn cartoonize!
  [ img s1 s2 s3 e1 e2 e3]
    (let [ output (smoothing! img s1 s2 s3) edge (edges! img e1 e2 e3)]
    (bitwise-and output edge output)
    output))
```

```
#'opencv3.cartoon3/cartoonize!
```

```
(->
  "resources/landscape/landscape-nature-sky-blue.jpg"
  imread
  (u/resize-by 0.2)
  (cartoonize! 6 9 7  7 9 11)
  (u/resize-by 0.5)
  (u/mat-view ))
```

```
(->
  "resources/landscape/amazing-beautiful-beauty-blue.jpg"
  imread
  (cartoonize! 5 9 7  7 7 5)
  (u/resize-by 0.25)
  (u/mat-view))
```



```
(->
  "resources/landscape/amazing-beautiful-beauty-blue.jpg"
  imread
  (u/resize-by 0.25)
  (cartoonize! 5 9 7  7 7 5)
  (u/mat-view))
```